

CLAIMS

- The embodiments of the invention in which an exclusive property or right is claimed are defined as follows. Having thus described the invention
- 5 what is claimed is:
1. A switch apparatus, comprising:
- 10 a plunger associated with an actuating lever, a stationary anchor, a moveable contact, and at least two stationary contacts, wherein one of said at least two stationary contacts comprises a normally open contact and another of said at least two stationary contacts comprises a normally closed contact; and
- 15 a snap-spring assembly reactive to said actuating lever, wherein said snap-spring assembly is assembled into said stationary anchor and said actuating lever to form a spring-anchor-lever assembly thereof including a central spring member loaded into an axial compression and persuaded to bend into a post-buckled elastic mode shape thereof to form a switch
- 20 apparatus in which said moveable and said at least two stationary contacts are responsive to an actuating force derived from said snap-spring assembly.
- 25 2. The apparatus of claim 1 wherein a downward depression of said plunger causes said actuating lever via an actuating force to move a hinged portion of said actuating lever upward along an arc thereby causing compression of said central spring member, resulting in a snap-action contact between said moveable contact and said at least two stationary contacts for completion of an electrical circuit thereof
- 30 3. The apparatus of claim 1 wherein said switch apparatus moves in a continuous uninterrupted motion from a first position of stability to a second position of stability when said actuation force is resilient and of a desired

rate.

4. The apparatus of claim 1 wherein said switch apparatus comprises a negative-rate switch, wherein a highest plunger force occurs at a free position and a lowest plunger force occurs at a full over-travel position thereof.

5. The apparatus of claim 4 wherein said switch apparatus comprises a switch contact force at a maximum point when said plunger is in said free position.

10 6. The apparatus of claim 4 wherein said switch apparatus comprises a switch contact force at a maximum point when said plunger is at said full over-travel position.

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7. The apparatus of claim 4 wherein said plunger moves without interruption through a full range of travel thereof when a free position plunger force is overcome by a resilient actuating force of an appropriate rate.

20 8. The apparatus of claim 4 wherein said negative-rate switch overcomes a resilient actuating force and returns said plunger to a free position without interruption when said resilient actuating force of an appropriate rate drops slightly below a full over-travel plunger force thereof.

25 9. The apparatus of claim 1 wherein said switch apparatus provides a negative plunger force deflection spring rate that is linear in slope throughout a total plunger travel.

10. A switch apparatus, comprising:

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a plunger associated with an actuating lever, a stationary anchor, a moveable contact, and at least two stationary contacts, wherein one of said

at least two stationary contacts comprises a normally open contact and another of said at least two stationary contacts comprises a normally closed contact; and

- 5 a snap-spring assembly reactive to said actuating lever, wherein said snap-spring assembly is assembled into said stationary anchor and said actuating lever to form a spring-anchor-lever assembly thereof including a central spring member loaded into an axial compression and persuaded to bend into a post-buckled elastic mode shape thereof to form a switch
10 apparatus in which said moveable and said at least two stationary contacts are responsive to an actuating force derived from said snap-spring assembly;
and

- 15 wherein a downward depression of said plunger causes said actuating lever via an actuating force to move a hinged portion of said actuating lever upward along an arc thereby causing compression of said central spring member, resulting in a snap-action contact between said moveable contact and said at least two stationary contacts for completion of an electrical circuit thereof

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11. A switching method, comprising the steps of:

- associating a plunger with an actuating lever, a stationary anchor, a moveable contact, and at least two stationary contacts, wherein one of said
25 at least two stationary contacts comprises a normally open contact and another of said at least two stationary contacts comprises a normally closed contact; and

- configuring a snap-spring assembly reactive to said actuating lever,
30 wherein said snap-spring assembly is assembled into said stationary anchor and said actuating lever to form a spring-anchor-lever assembly thereof including a central spring member loaded into an axial compression and

persuaded to bend into a post-buckled elastic mode shape thereof to form a switch apparatus in which said moveable and said at least two stationary contacts are responsive to an actuating force derived from said snap-spring assembly.

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12. The method of claim 11 further comprising the step of initiating a downward depression of said plunger to cause said actuating lever via an actuating force to move a hinged portion of said actuating lever upward along an arc thereby causing a compression of said central spring member,
10 resulting in a snap-action contact between said moveable contact and said at least two stationary contacts for completion of an electrical circuit thereof

13. The method of claim 11 wherein said switch apparatus moves in a continuous uninterrupted motion from a first position of stability to a second
15 position of stability when said actuation force is resilient and of a desired rate.

14. The method of claim 11 wherein said switch apparatus comprises a negative-rate switch, wherein a highest plunger force occurs at a free
20 position and a lowest plunger force occurs at a full over-travel position thereof.

15. The method of claim 14 wherein said switch apparatus comprises a switch contact force at a maximum point when said plunger is in said free
25 position.

16. The method of claim 14 wherein said switch apparatus comprises a switch contact force at a maximum point when said plunger is at said full over-travel position.

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17. The method of claim 14 wherein said plunger moves without interruption through a full range of travel thereof when a free position plunger

force is overcome by a resilient actuating force of an appropriate rate.

18. The method of claim 14 wherein said negative-rate switch overcomes a resilient actuating force and returns said plunger to a free position without 5 interruption when said resilient actuating force of an appropriate rate drops slightly below a full over-travel plunger force thereof.

19. The method of claim 11 wherein said switch apparatus provides a negative plunger force deflection spring rate that is linear in slope throughout 10 a total plunger travel.

20. The method of claim 11 further comprising the steps of:

configuring said spring-anchor-lever assembly to comprise at least 15 one spring center member, wherein elastic post-buckling is maintained for stabilization thereof.